PHIFER WIRE PRODUCTS, INC.
P. O. BOX 1700 • TUSCALOOSA, ALABAMA 35403-1700 U.S.A.

• CHARLES E. MORGAN
Executive Vice President and Corporate Counsel

June 2, 1992

Mr. Tim Battersby
The Home Insurance Company
P. O. Box 168
Grand Rapids, MI 49501-1700

Re: Kevin and Carol Chase
Claim Number 262-719639-220

Dear Mr. Battersby:

I was surprised and disturbed to hear that Mr. Chase contends that Phifer Wire was negligent in dealing with the odor problem associated with some of our fiberglass insect screening. I have reviewed our records and spoken with the founders and owners of this company as well as with plastisol engineers and key members of our sales department and, based on that research, will attempt to summarize the history of this problem.

Phifer Wire Products was founded in 1952 and has been the world's leading manufacturer of insect screening for at least the last ten years. We are extremely proud of our record of consistent quality over the past four decades. The cause of the odor coming from the silver-gray screening in the Chases' home was the accelerated deterioration of the product due to ultraviolet sun rays. Prior to 1988, that problem was unknown to this company and even today it is rare.

In January 1988 we changed our plastisol stabilizer in order to make the product environmentally safer. It had never been dangerous to consumers, but the change made disposal of scrap material safer. Though we succeeded in making the product safer, we miscalculated in mixing the plastisol formula for silver-gray screening by not putting enough pigment into it. The result was the material would deteriorate rapidly when exposed to direct sunlight. The odor was associated with this process of rapid deterioration. By the following year, we had had several product failures, discovered their cause, and, in June 1989, improved the plastisol formula (without putting back any dangerous substances), thus ending this problem forever.

Prior to hearing from the Chases, we had replaced deteriorated screening for some homeowners, but not one had complained of any physical effects from the screening (most of these homeowners had the screens mounted on the exterior of their windows so it would be unlikely that the odor would bother them). When I collected some of this defective screen in my office, I noticed that it had

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a bad odor, but I never heard of any possible physical side effects until I spoke with Carol Chase on October 21, 1991.

Immediately upon learning of this potential hazard, we hired Dr. Meeks to analyze the material and the odors. After intensive research, Dr. Meeks determined that the odor had only an irritant effect and no chronic or long lasting effects. His report is consistent with my phone conversation with Mrs. Chase, in which she told me the symptoms cleared up as soon as the window screens were removed.

This company has no history of making dangerous or harmful products and no experience with liability claims. I have recently spoken with the President and with the C.E.O., who has held that position since the company was founded forty years ago, and they confirmed that neither the company nor any of its insurance carriers has ever paid a personal injury products liability claim. Please feel free to confirm Phifer's record with the "Index System" or with any of our carriers. We have been insured by The Home since 12/31/88, by Liberty Mutual for the three years prior to that and by Cigna prior to 1985. In fact, except for Mr. Chase's letter of April 6, 1991, Phifer Wire has never even received a claim or demand for money damage to compensate for personal injury.

I hope this information will be helpful to you in adjusting this claim. If you need additional information about what happened and when, please give me a call.

Sincerely yours,

PHIFER WIRE PRODUCTS, INC.

Charles Morgan

Charles Morgan

CM:jh

cc: Mr. Walter Gary
Pritchett-Moore, Inc.

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This letter was received by neighbors who exchanged their screens because of the noise only. Those who complained of physical effects did not receive this letter which was issued after Charles Morgan + Harry Rose (Phifer Wire Products) (Weatherman) had visited our neighborhood.

M.S.C.

PHIFER WIRE PRODUCTS, INC.
P. O. BOX 1700 • TUSCALOOSA, ALABAMA 35403-1700 U.S.A.

CHARLES E. MORGAN
Executive Vice President and Corporate Counsel

September 25, 1992

Ms. Karen Manvel
6740 Sun Valley Drive
Clarkson, MI 48348

Dear Ms. Manvel:

I recently learned that you had a problem with window screening that was manufactured by Phifer Wire Products and installed in your home by Weathervane Window, Inc. That screening was manufactured in 1988. A small portion of the screen we made that year degraded prematurely when exposed to continuous direct sunlight. That problem was corrected in 1989 and the replacement screening Weathervane installed for you should last for many years without any problems. If, however, you are not completely satisfied with the replacement screening, please call me on our toll free number (800-633-5955) so that we can address any remaining problems or questions.

Phifer Wire has earned a good reputation over the past forty years because we stand behind our products 100%. We want to preserve that reputation by assuring that every consumer of our products is completely satisfied.

Sincerely yours,

PHIFER WIRE PRODUCTS, INC.

Charles Morgan

Charles Morgan

CM:jh

cc: Mr. Gary Rose
Weathervane Window, Inc.

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PHONE 205/345-2120 • FAX 205/750-4450 • TELEX 261328 (PHIF UR)

Since Phifer Wire's Insurance Co. has offered this family a financial settlement, I didn't include their names. They haven't decided if they should except the money.

PHIFER WIRE PRODUCTS, INC.
P. O. BOX 1700 • TUSCALOOSA, ALABAMA 35403-1700 U.S.A.

CHARLES E. MORGAN
Executive Vice President and Corporate Counsel

July 6, 1992

Clarkston, MI 48348

Dear Mr. & Mrs. .

I just received your June 29 letter in today's mail. As I told you in our conversations, we at Phifer Wire deeply regret the problems you had with the fiberglass insect screening installed in your home. We know that you are sincere in your belief that you have suffered physically and financially because of a defective product we manufactured and you should be compensated for that. I have faxed a copy of your letter to Mr. Tim Battersby at The Home Insurance Company office in Grand Rapids. Mr. Battersby will contact you regarding your claim for damages.

Based upon the findings of our toxicologist, I must take issue with your characterization of the fumes as "toxic" and of the screening as "hazardous materials." I believe these two terms have technical meanings which do not exactly fit our screening material, even if it was defective and emitted odors that were irritating.

In addition to those technicalities, I must strongly disagree with your statement that we "knew about" these "hazardous materials" and "did not act upon responsibly in order to notify customers of possible health risks." I recently reviewed all of our files, interviewed the owners, officers and technicians here at Phifer and prepared a summary for the insurance company explaining the history and origins of this problem. I have enclosed a copy of my letter dated June 2, 1992 to Mr. Battersby of The Home Insurance Company. Mr. and Mrs. had also raised the question of whether Phifer Wire acted promptly and responsibly in dealing with this problem once it was detected. As stated in my letter to the insurance company, from the time this company was founded in 1952 until my telephone conversation with Carol Chase on October 21, 1991, we had no reason to believe that any product ever manufactured by Phifer Wire had or possibly could harm anyone. By October 21, 1991, both you and the Chases had removed the screening from your home so it was too late for us to warn you about the problem. We did immediately hire outside independent experts to research the matter to determine if the odors or fumes were toxic or could have long term adverse physical effects. We wanted to test

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PHONE 205/345-2120 • FAX 205/759-4450 • TELEX 261326 (PHIF UR)

Founded 1952 By REESE PHIFER

OAKLAND
COUNTY MICHIGAN
DEPARTMENT OF INSTITUTIONAL
AND HUMAN SERVICES

Daniel T. Murphy, Oakland County Executive
HEALTH DIVISION
Thomas J. Gordon, Ph.D., Manager

MEMORANDUM

July 22, 1992

TO: CAROL CHASE

FROM: NELSON HAYNES, R.S., SENIOR PUBLIC HEALTH SANITARIAN
OAKLAND COUNTY HEALTH DIVISION N.H.

SUBJECT: WINDOW SCREENS AT RESIDENCE LOCATED AT 6881 VAIL CT., CLARKSTON, MICHIGAN 48348

In March 1990 I conducted a complaint investigation at the above captioned address. Residents were concerned about a foul, acrid odor coming from rooms in direct sunlight. I did agree that their was a strong, irritating odor. Although I could not determine the exact cause I did feel that it was at minimum an extreme nuisance and corrective action should be taken as soon as possible as the residents health could be affected.

If this division can be of any further assistance, please call (3213) 858-1327.

Daniel T. Murphy-Oakland County Executive
OAKLAND
COUNTY MICHIGAN
Robert A. Long, R.S., M.P.H.
Administrative Assistant
Environmental Health Services
Health Division
Department of Institutional and Human Service
Health Division Bldg. 858-1333
1200 N. Telegraph Rd., Pontiac, Michigan 48053
48341

1200 North Telegraph Road
Pontiac, Michigan 48341

27725 Greenfield Road
Southfield, Michigan 48076-3625

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Dr. Robert Meeks
presently is based at
Dow Corning Center - Midland
Michigan!

UAB SCHOOL OF PUBLIC HEALTH

Department of Environmental Health Sciences

February 21, 1992

Mr. Anthony Gamble
Phifer Wire Products, Inc.
P.O. Box 1700
Tuscaloosa, AL 35403-1700

Dear Anthony:

We have essentially completed our assessment of the source of the odors associated with the polymer coated fiberglass screening material you recently sent to us.

In order to qualitatively describe the odors believed to be originating from the polymer coated fiberglass screen material, the initial studies in our laboratory utilized approximately 30 square centimeter samples of various aged and non-weathered screen material cut into 1 cm square pieces as representations of the bulk material.

These samples were introduced into glass vials and sealed with teflon crimp cap seals. The glass vials were placed in a Hewlett-Packard model 19354 Headspace Analyzer which was interfaced to a Hewlett-Packard model 5890 Gas Chromatograph using a Hewlett-Packard model 5971 Mass Spectrometer as the detector. The column in the gas chromatograph was a 25 meter HP5. The headspace sampler was set to a total carrier flow of 90 ml/min, with auxiliary pressure set at 1.4 bar. The sample loop in the headspace analyzer had a 1 ml total volume. The split ratio on the gas chromatograph was 1:4, with a column head pressure of 4 psi. The gas chromatograph was operated isothermally at 120 degrees centigrade. The mass spectrometer scanned from 30 to 500 m/z.

Headspace optimization included sampling a mixed composite of aged and non-weathered samples of screen material at temperatures ranging from 50 degrees centigrade to 120 degrees centigrade. It was found that peak height of compounds originating from these samples increased with temperature until 110 degrees. At temperatures higher than this a broad non-specific peak appeared indicating possible degradation of the polymer material.

Analyses carried out on aged and non-weathered samples presented evidence that release of compounds from the samples increases with

The University of Alabama at Birmingham
309 Tidwell Hall • 720 South 20th Street • UAB Station
Birmingham, Alabama 35294-0008 • (205) 934-7032 • FAX (205) 975-6341

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weathering. That is, weathered samples produced peak heights 10 - 200 times larger than non-weathered samples.

In these initial studies, the peaks from the gas chromatograph of these materials exhibited very low retention times indicating low mass, low boiling point, and possibly polar materials. Also, the peak areas were too small to obtain reliable mass spectral identification. However, comparison of these mass spectra with NBS standards indicated the following compounds as tentatively identified:

COMPOUND	CAS #
Ethanone, 1-cyclobutyl-	3019258
3-octen-2-one, 7-methyl-	33046810
1-Butanol, 3-methyl-, acetate	123922
2H-Pyran, 3,4-dihydro-6-methyl	16015115
[2,2'-Bifuran]-5,5'-dicarboxylic acid, 4	5905033
Propanamide, 2-methyl-	563837
1,2-Benzenedicarboxylic acids:	
diisooctyl	27554263
3-nitro	603112
diundecyl	3648202
diisodecyl	26761400
diheptyl	3648213
Aspidofractinine-3-methanol, (2.alpha.3	2656442

These compounds would appear to be oxidation products of monomer material coated onto the fiberglass screen, various phthalates associated with plasticizers used in the manufacture of the polymer, and pigment used in coloring the screen material.

It cannot be overstressed that these were initial studies and were only tentative identifications. In order to further characterize material believed to be released from vinyl coated screens we installed a 3 ml sample loop on a Hewlett-Packard Headspace sampler interfaced to a Hewlett-Packard 5890 Gas Chromatograph using a Hewlett-Packard 5970 Mass Spectrometer as the detector,and we installed a more polar column.

Two studies have been completed with this new configuration, specifically, a temperature study and a series of analyses of vinyl coated screen materials. Conditions for the studies were as follows:

The headspace sampler bath was set at a series of temperatures ranging from 100 to 140 degrees centigrade. Samples were analyzed at 100, 110, 120, 130, and 140 degrees centigrade. Auxiliary flow was set to 1 bar pressure as was the carrier gas. This resulted in a flow of 80 ml/min to the gas chromatograph.

The gas chromatograph was set to a split vent flow of 20 ml/min resulting in a total of 100 ml/min flow. The purge vent was set to 5 ml/min resulting in a 1:20 split ratio. The gas chromatograph was operated at 120 degree centigrade initially for 7 minutes then ramped to 250 degrees centigrade at 10 degrees centigrade per minute, then programmed to remain at that temperature for 10 minutes. A Hewlett-Packard FFAP 50 meter x 0.2 uM column was installed for these analyses.

The mass spectrometer was programmed to scan from 35 to 450 M/Z.

For the series of vinyl coated samples, the headspace sampler operated at 140 degrees centigrade. Each sample consisted of approximately 24 square inches of material rolled into the headspace sampler vial.

Increasing temperature of the headspace sampler resulted in successively higher amounts of degradation materials to be transferred to the gas chromatograph. Seven peaks were predominant in this series of samples, indicating at least seven separate compounds. There were also several other small peaks with signals too low to provide sufficient qualitative information for characterization.

Three samples of differing materials were analyzed at 140 degrees centigrade. These included the bronze vinyl coated fiberglass from Arizona, the gray vinyl coated material included with the bronze material, and another sample of gray vinyl coated material from a round mailing tube. Each of these samples exhibited similar chromatographic behavior. That is, they all exhibited the same seven peaks as shown on the associated chromatographs attached to this report.

The mass spectra of each of these peaks was matched with NBS standard spectra and the ten best matches were listed for each peak. A list of the seven most likely compounds from this analysis also is attached. It can been inferred from this data that these compounds represent oxidation products of the vinyl material and associated plasticizers.

It can be envisioned that different product ratios can be formed depending on environmental conditions. The major product appears to be a small molecular weight ketone, amine or acid formed from oxidative cleavage of HCl from the polyvinylchloride. This can result in the formation of chlorinated polyenes, low molecular weight compounds such as propanes, cyclopropanes and butanes, cyclobutanes, and their associated acids. These compounds typically exhibit high vapor pressures, thus the odors associated with aging of the vinyl coating.

The seven compounds identified by us as being released from the weathered screen materials are ketones, amines, and low molecular weight organic acids. I have surveyed the toxicology

literature for information on the potential adverse health effects that might result from exposure to these materials. As I suspected there was very little information in the literature as to the human toxicity of these compounds. However, it is well recognized that compounds such as these (i.e. ketones, amines, and weak organic acids) can be strong irritants to the nose, eyes, upper respiratory tract, and mucous membranes. Signs and symptoms related to exposure to these compounds might in some cases mimic those of a cold or flu. These would consist of eye irritation or red eyes, a runny nose, a raspy feeling in the throat, some hoarseness, and possibly bronchitis. Since these are all irritant effects it is to be expected that once the offending agent was removed, then these symptoms should reverse themselves and the health status should revert back to normal. It is important to stress that chronic or long-term effects resulting form exposure to these agents is not to be expected.

I hope this provides you with the information needed. If you have any questions concerning our analyses and/results or need any additional information, please do not hesitate to contact me. As always, I remain

Sincerely yours,

Robert G. Meeks

Robert G. Meeks, Ph.D., D.A.B.T.

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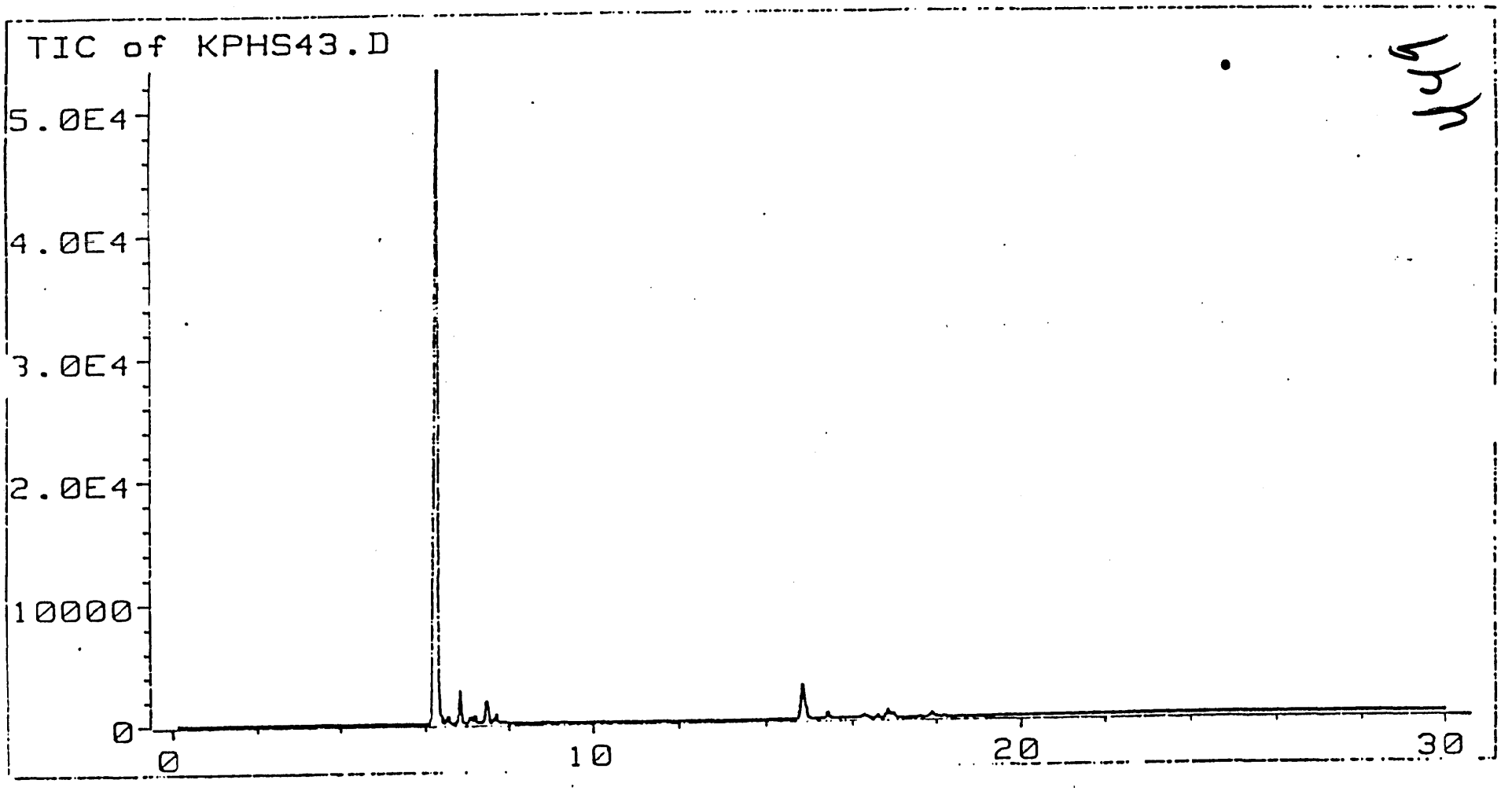
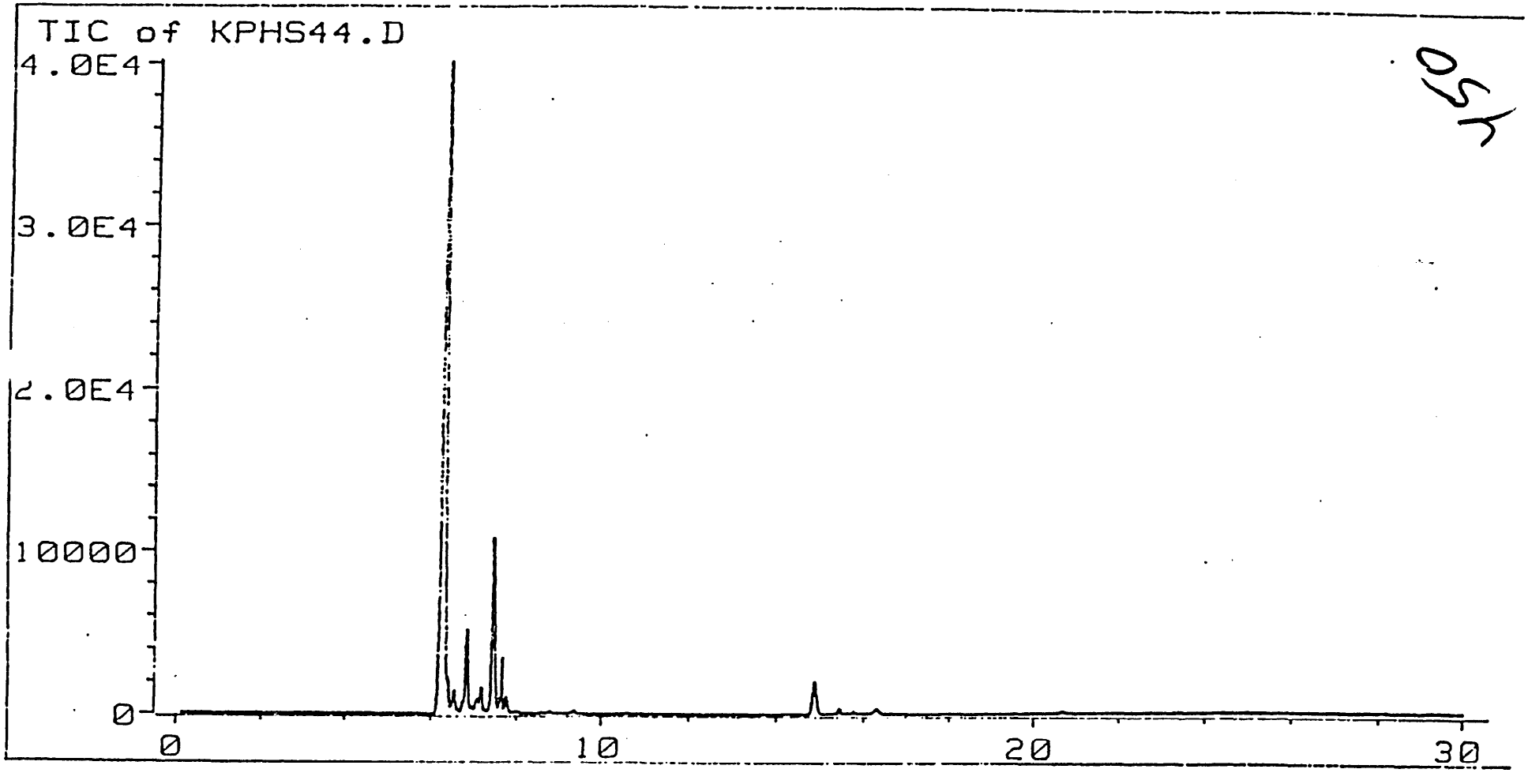
CHEMICALS IDENTIFIED AS BEING PRESENT IN
THE WEATHERED SCREENING MATERIAL SUPPLIED BY
PHIFER WIRE, INC.

Peak 1	2-Pentanamine, 4-methyl-	CAS #108-09-8
Peak 2	Butanoic Acid, 3-oxo-,2-methylpropyl	CAS #7779-75-1
Peak 3	2-Pentanone, 5-chloro	CAS #5891-21-4
Peak 4	Propane, 1,1'sulfonylbis	CAS #598-03-8
Peak 5	Ethanone, 1-cyclobutyl-	CAS #3019-25-8
Peak 6	2-Butanone, 4-butoxy-3-methyl-	CAS #54340-94-2
Peak 7	Acetamide, N-[2-[3,4-dihydroxy-.alpha.	CAS #28177-12-0



BRONZE VINYL COATED FIBERGLASS



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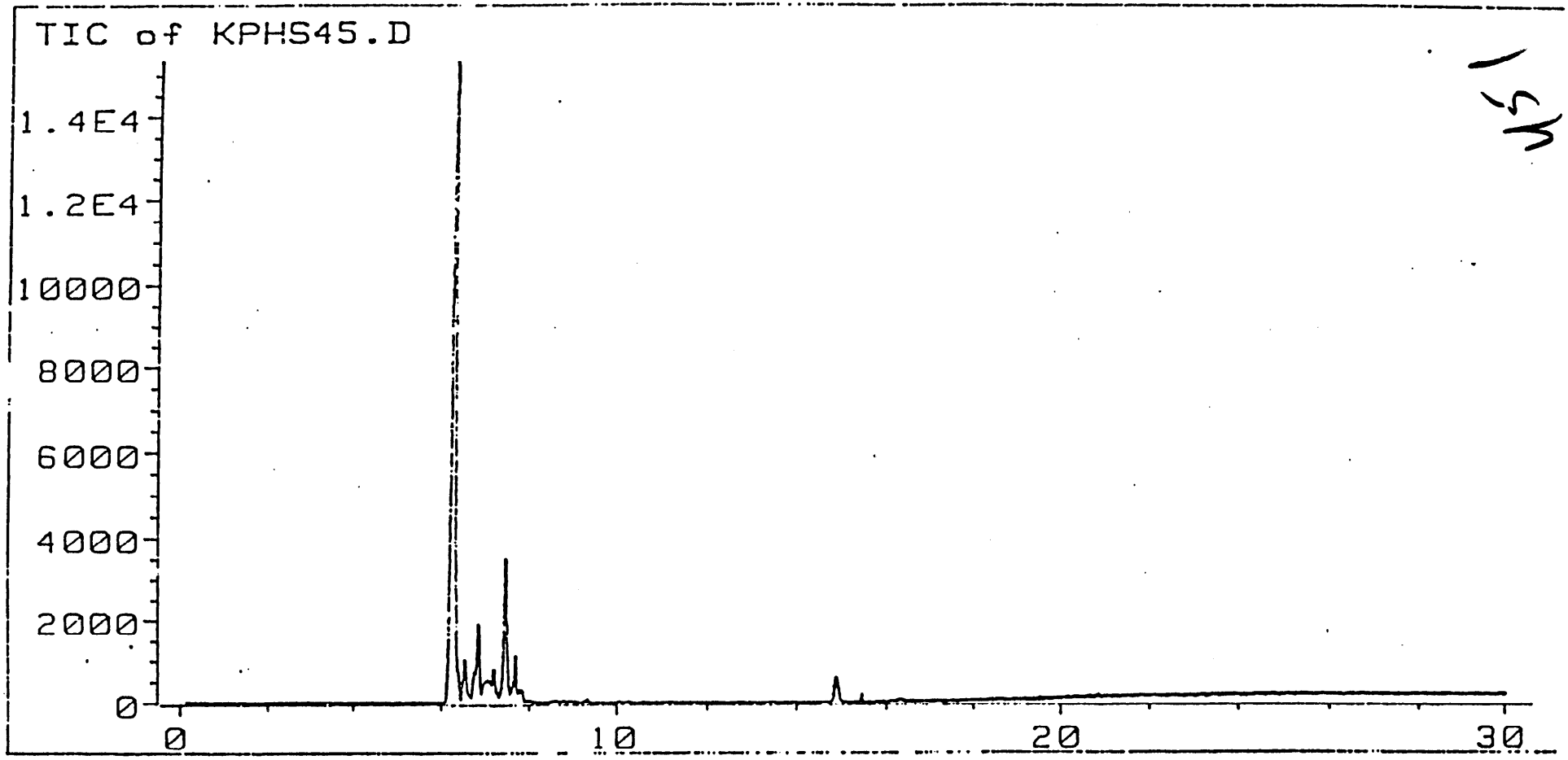
GRAY VINYL COATED FIBERGLASS



GRAY VINYL COATED FIBERGLASS FROM MAILING TUBE

LIBRARY SEARCH RESULTS

Scan 344 (6.322 min) of KPHS45.D
GRAY VINYL COATED FIBERGLASS FROM MAILING TUBE

Library file: DATA:NBS_REVE.L
Library name: NBS MASS SPECTRAL DATABASE

		CAS #	Library Index #	Match Quality
1:	2-Pentanamine, 4-methyl- (9CI)	108098	1391	9794
2:	2-Hexanamine, 4-methyl- (9CI)	105419	2523	9785
3:	2-Butanamine, 3-methyl- (9CI)	598743	686	9771
4:	Dodecanoic acid, 11-amino-, methyl ester	56817926	19553	9771
5:	2-Heptanamine (9CI)	123820	2525	9764
6:	2-Butanamine, 3,3-dimethyl- (9CI)	3850304	1398	9761
7:	2-Hexanamine (9CI)	5329793	1401	9754
8:	Cyclopropane, 1-bromo-1,2-dichloro- (8CI	24071634	13622	9733
9:	Cyclopropane, 1,1-dibromo-2-chloro-2-flu	24071576	22007	9733
10:	Phenol, 4-[2-(methylamino)ethyl]- (9CI)	370989	7330	9726

RETRIEVE
Which match (1 to 10):

Y: Set of 4 MS
X: Scan 344 (6.322 min) of KP

Scan 342 (6.282 min) of KPHS45.D
GRAY VINYL COATED FIBERGLASS FROM MAILING TUBE

m/z	abund.	m/z	abund.	m/z	abund.	m/z	abund.
38.10	28	42.10	72	45.95	43	56.05	46
40.00	1531	44.00	10000	55.05	21	57.05	44
41.10	201	45.00	146				

LIBRARY SEARCH RESULTS

Scan 355 (6.526 min) of KPHS45.D
GRAY VINYL COATED FIBERGLASS FROM MAILING TUBE Peak #2

Library file: DATA:NBS_REVE.L
Library name: NBS MASS SPECTRAL DATABASE

		CAS #	Library Index #	Match Quality
1:	Butanoic acid, 3-oxo-, 2-methylpropyl es	7779751	8653	9237
2:	Nickel, [5,6,17,18-tetrahydrotetrabenzo[	72101349	37007	8912
3:	Propane, 2-(ethenyloxy)- (9CI)	926658	637	8745
4:	Propanamide, 2-methyl- (9CI)	563837	676	8634
5:	1H-Cyclonona[1,2-c:5,6-c']difuran-1,3,6,	21794014	36955	8607
6:	Butanoic acid, 2,2-diacetyl-3-oxo-, ethy	19446516	17412	8519
7:	Acetamide, N-[2-(acetyloxy)-2-[4-(acetyl	55145647	28994	8505
8:	1-Butanamine, 3-methyl-N-(3-methylbutyl)	28023747	13259	8481
9:	Pentylamine, N-isobutyl-N-nitroso- (8CI)	28023805	13260	8477
10:	4,15:5,10-Dimethanobenzofuro[3',2':7,8][	24945935	34414	8462

RETRIEVE
Which match (1 to 10):

Y: #8653 Butanoic acid, 3-oxo
X: Scan 355 (6.526 min) of KP

LIBRARY SEARCH RESULTS

Scan 372 (6.832 min) of KPHS45.D
GRAY VINYL COATED FIBERGLASS FROM MAILING TUBE
Peak #3
Library file: DATA:NBS_REVE.L
Library name: NBS MASS SPECTRAL DATABASE

		CAS #	Library Index #	Match Quality
1:	2-Pentanone, 5-chloro- (8CI9CI)	5891214	2947	9869
2:	s-Indacen-1(2H)-one, 3,5,6,7-tetrahydro-	54889597	15484	9780
3:	3-Pentenoic acid, 4-methyl- (8CI9CI)	504858	2318	9765
4:	2-Hexanone, 5-methyl- (8CI9CI)	110123	2398	9765
5:	3(2H)-Furanone, 4-hydroxy-5-(hydroxymeth	66727944	6171	9708
6:	1-Propen-2-ol, acetate (8CI9CI)	108225	1242	9699
7:	3-Penten-2-one, 4-methyl-, O-methyloxime	56336119	3707	9681
8:	2-Propanone, 1-(1-methylethoxy)- (9CI)	42781124	2629	9673
9:	2-Pentanone, 5-(acetyloxy)- (9CI)	5185977	6188	9648
10:	Acetic acid, 2-propenyl ester (9CI)	591877	1249	9632

RETRIEVE
Which match (1 to 10):

Y: #2947 2-Pentanone, 5-chlor
X: Scan 372 (6.832 min) of KP

LIBRARY SEARCH RESULTS

Scan 391 (7.204 min) of KPHS45.D
GRAY VINYL COATED FIBERGLASS FROM MAILING TUBE F.,k#4

Library file: DATA:NBS_REVE.L
Library name: NBS MASS SPECTRAL DATABASE

	CAS #	Library Index #	Match Quality
1: Propane, 1,1'-sulfonylbis- (9CI)	598038	7162	9321
2: 4-Hepten-2-one, (E)- (9CI)	36678430	2150	9318
3: 2-Heptanone, 6-methyl-5-nitro- (9CI)	66972029	11269	9296
4: 2,4-Oxazolidinedione, 5,5-dimethyl- (8CI	695534	4000	9293
5: Propane, 2-methyl- (8CI9CI)	75285	98	9290
6: 4-Penten-2-one (8CI9CI)	13891877	522	9282
7: Butane, 2,2-dichloro-3-methyl- (8CI9CI)	17773669	5489	9241
8: 4H-Pyran-4-one, 3,5-diacetyltetrahydro-2	55030665	17148	9239
9: 2,3-Pentanedione, 4-methyl- (8CI9CI)	7493585	2346	9195
10: Acetic acid, 2-propenyl ester (9CI)	591877	1249	9188

RETRIEVE
Which match (1 to 10):

Y: #5489 Butane, 2,2-dichloro
X: Scan 391 (7.204 min) of KP

LIBRARY SEARCH RESULTS

Scan 404 (7.436 min) of KPHS45.D
GRAY VINYL COATED FIBERGLASS FROM MAILING TUBE

F.,2ICBS

Library file: DATA:NBS_REVE.L
Library name: NBS MASS SPECTRAL DATABASE

	CAS #	Library Index #	Match Quality
1: Ethanone, 1-cyclobutyl- (9CI)	3019258	1083	8964
2: 3-Octen-2-one, 7-methyl- (9CI)	33046810	5670	8842
3: 1-Butanol, 3-methyl-, acetate (9CI)	123922	4155	8543
4: Cyanic acid, 2,2-dimethylpropyl ester (9	1459445	2250	8541
5: 2-Pentanone, 3-methylene- (8CI9CI)	4359777	1088	8514
6: 2H-Pyran, 3,4-dihydro-6-methyl- (8CI9CI)	16015115	1098	8500
7: 3-Hepten-2-one (8CI9CI)	1119444	2110	8480
8: 3-Butyn-2-ol (8CI9CI)	2028639	214	8405
9: 1-Propanone, 2-methyl-1-[2-(1-methylethy	56259155	7837	8394
10: 5-Undecene, 8-methyl-, (E)- (9CI)	39546855	10358	8373

RETRIEVE
Which match (1 to 10):

Y: #5670 3-Octen-2-one, 7-met
X: Scan 404 (7.436 min) of KP

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LIBRARY SEARCH RESULTS

Scan 418 (7.690 min) of KPHS45.D
GRAY VINYL COATED FIBERGLASS FROM MAILING TUBE Tank

Library file: DATA:NBS_REVE.L
Library name: NBS MASS SPECTRAL DATABASE

		CAS #	Library Index #	Match Quality
1:	2-Butanone, 4-butoxy-3-methyl- (9CI)	54340942	8731	9260
2:	3-Buten-2-one, 3-methyl- (8CI9CI)	814788	503	9140
3:	3-Penten-2-one, 3,4-dimethyl- (8CI9CI)	684946	2106	9011
4:	2-Butanone, 4-hydroxy-3-(hydroxymethyl)-	6868979	4429	9008
5:	Cyclopenta[c]furo[3',2':4,5]furo[2,3-h][	55446270	29503	8949
6:	Ethanone, 1-cyclopropyl- (9CI)	765435	507	8890
7:	Ethanone, 1-(7-oxabicyclo[4.1.0]hept-1-y	15121014	5563	8881
8:	2-Pentanethiol, 2-methyl- (8CI9CI)	1633972	2830	8839
9:	Propane, 2-methyl- (8CI9CI)	75285	98	8779
10:	Heptane, 4-azido- (8CI9CI)	27126223	5730	8779

RETRIEVE
Which match (1 to 10):

Y: Set of 4 MS
X: Scan 418 (7.690 min) of KP

LIBRARY SEARCH RESULTS

Scan 818 (14.882 min) of KPHS45.D
GRAY VINYL COATED FIBERGLASS FROM MAILING TUBE Tank 7

Library file: DATA:NBS_REVE.L
Library name: NBS MASS SPECTRAL DATABASE

		CAS #	Library Index #	Match Quality
1:	Acetamide, N-[2-[3,4-dihydroxy-.alpha.-[	28177120	38099	9334
2:	Acetic acid, silver(1+) salt (8CI9CI)	563633	10151	9092
3:	Butanoic acid, 3-hydroxy- (9CI)	300856	1553	8942
4:	2-Butanone, 3-hydroxy- (8CI9CI)	513860	729	8832
5:	Propanoic acid, 2-(aminooxy)- (9CI)	2786223	1631	8779
6:	Compactinervine, diacetate (ester) (8CI)	2111855	35159	8725
7:	2-Propanone, 1-methoxy- (8CI9CI)	5878193	737	8702
8:	Butanoic acid, 3-hydroxy-, ethyl ester,	35608641	4434	8660
9:	2-Pentanol, 3-chloro-4-methyl-, (R*,S*)-	74685486	4917	8614
10:	Propane, 1-(1-methylethoxy)- (9CI)	627087	1490	8591

RETRIEVE
Which match (1 to 10):

Y: #1553 Butanoic acid, 3-hyd
X: Scan 818 (14.882 min) of K

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HEALTH EFFECTS GROUP, INC.
P.O. Box 31778 Tucson, Arizona 85717 (602) 885-3442

Toxicology
Environmental Health
Industrial Hygiene

DETERMINATION OF VOLATILE EMISSIONS FROM SUNTROL WINDOW SCREEN MATERIAL

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BACKGROUND

This analysis was generated in response to a request from John Edwards, President of Suntrol Window Products, concerning volatile emissions from degraded PVC window screens that had been installed by Suntrol. The visible degradation of installed screens was accompanied by a strong odor. Employee health complaints had been registered during removal and subsequent processing of the degraded screens.

Concern about possible adverse health effects associated with employee exposures to the volatile emissions generated the request to attempt a characterization of the emissions. It was noted during phone conversations with Mr. Edwards that the odor from the screens was more predominant during hot weather, and when large amounts of the degraded screen material were stored pending return to the manufacturer.

METHODOLOGY

Two sample panels of degraded screen material (approximately 1.5 square meters) were delivered by express carrier to the HEG office on 11-6-91. The panels was held in the carrier package at room temperature until 11-8-91, at which time approximately one-half of each panel was transferred into a 4 liter glass chamber for volatile emission sample collection. Prior to insertion of the screen samples, the glass chamber was cleaned and rinsed with distilled water.

The initial sampling strategy involved concentrating volatile emissions from the screen panels onto activated charcoal and silica gel adsorption tubes. The glass chamber was sealed with an aluminum foil cap containing three sampling ports. A glass tube was inserted through one port to the bottom of the chamber. This tube served as the source of make-up air during sample collection. The remaining two ports were used for the activated charcoal and silica gel vapor adsorption tubes used to collect volatile organic compound (VOC) emissions from the screen material.

Adsorption tube sampling was conducted outdoors to minimize potential interferences from the sample make-up air. The general air flow pattern during sampling was from the ambient environment into the bottom of the glass chamber, through the screen panels, and into the vapor adsorption tubes.

Both an activated charcoal tube (SKC 226-400/200 mg) and a silica gel tube (Supelco Orbo 53) were used for VOC adsorption. A sample flow rate of 0.6 liters/min over a sampling period of 167 minutes yielded a total sample volume of 100 liters through each adsorption tube. An identical sample collection train was used outside the glass chamber to collect simultaneous control samples of ambient air in the immediate vicinity of the sample chamber.

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The sample tubes were submitted for analysis to the University of Arizona Mass Spectrometry Facility on 11/8/91. Solvent extractions of the tubes were completed using carbon disulfide (charcoal tubes) and ethanol (silica gel tubes).

A second sample collection procedure employed at the analytical laboratory involved a dynamic headspace/cryogenic trap/thermal desorption technique applied to a sample of the screen material in an attempt to enhance analytical sensitivity and to look for compounds that may have co-eluted with the sorbant tube extraction compounds. This sample was also analyzed with the gas chromatograph/mass spectrometer (GC/MS).

RESULTS AND DISCUSSION

GC/MS analysis of the charcoal and silica gel adsorption tubes showed a complex mixture of very volatile compounds which eluted early from the GC. Low levels of pthalates were also detected in the samples. Use of the cryogenic trap technique to further concentrate the early eluting volatiles revealed the major components to be four to seven carbon ketones, with methyl ethyl ketone (MEK) and methyl vinyl ketone (MVK, 3-buten-2-one) being the most abundant compounds. In addition to the ketones, other compounds detected at low levels included aliphatic hydrocarbons, aldehydes, trimethylsilanol, and benzene.

Pthalates are widely used as plasticizers. Physically, pthalates tend to be stable compounds with very low vapor pressures. Physiologically, pthalates represent one of the lowest toxicity classes used in industry. They have generally also exhibited a low order of toxicity in experimental animals.

As a class, the ketones tend to be volatile liquids with characteristic odors. At concentrations greater than 300 ppm (parts per million parts air), methyl ethyl ketone has been found to be irritating to the eyes, nose, and throat. It is also capable of causing nausea at such concentrations. No permanent adverse effects have been noted following exposures to MEK of over 700 ppm. The current threshold limit value for mean 8-hour exposures to MEK is 200 ppm; the short term exposure limit for 15 min. periods is 300 ppm.

Higher order ketones such as MVK tend to be more irritating and have more penetrating odors. MVK has been characterized as having a powerfully irritating odor. Threshold limit values have not been established for MVK.

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EXECUTIVE SUMMARY

A sample of degraded PVC window screen material was submitted to Health Effects Group, Inc. for characterization of volatile organic compounds emitted from the material. Employee health related complaints are potentially associated with exposures to the emissions during handling and processing of the degraded screen material.

Volatile emissions from the screens were sampled with two different techniques and submitted for qualitative mass spectral analysis. A number of different volatile compounds were detected during analysis. The major compounds detected were several different ketones, which are generally not highly toxic but can be irritating with penetrating odors.

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CONCLUSIONS

Gas chromatographic/mass spectral analysis showed that the primary volatile emissions detected in the head space of degraded PVC screen material were ketones, with methyl ethyl ketone and methyl vinyl ketone being the most predominant. While these compounds do not appear to be acutely toxic, they can be skin and respiratory system irritants with powerfully penetrating odors.

In the absence of information on actual exposure levels to these compounds during handling and processing of the degraded screen material, precautions to preclude excessive skin and respiratory exposures should be taken.

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